

# Subtotal Cholecystectomy as a Safe and Effective Alternative for the Difficult Gallbladder

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## Background

- Cholecystectomy is the standard treatment for acute cholecystitis and most cholecystectomies are performed via a laparoscopic approach.<sup>1-3</sup>
- Bile duct injury remains a devastating complication following cholecystectomy.<sup>4,5</sup>
- In severe cases of acute cholecystitis the inflammation and adhesions distort biliary anatomy and increase the risk of bile duct injuries and other complications.<sup>6</sup>
- If the CVS cannot be achieved, several maneuvers, including subtotal cholecystectomy (SUB), are available to prevent complications.<sup>7-9</sup>
- From 2003-2014 the incidence of performing SUB increased from 0.12% to 0.28% for all cholecystectomies and the rates of conversion from laparoscopic to open total cholecystectomy decreased from 10.5% to 7.6%.<sup>3</sup>
- Compared to an open cholecystectomy, SUB is associated with decreased postoperative pain, shorter hospital stay, and lower risk of incisional hernia.<sup>8,10-11</sup>

## Objectives

There is limited data identifying patients who are most likely to require SUB as well as postoperative outcomes for this patient population.

- AIM 1:*** Determine preoperative and intraoperative risk factors predictive of SUB as compared to a total cholecystectomy (TOT)
- AIM 2:*** Compare short- and long-term postoperative outcomes of SUB versus TOT

## Methods

- Retrospective review from September 2017 - December 2019
- Inclusion criteria:***
  - Patients admitted from NM ED who underwent SUB or TOT by an Acute Care surgeon for acute biliary disease
- Data collected:***
  - Patient demographics, Clinical presentation (vitals, labs, imaging), Intraoperative details, Postoperative outcomes (Drain placement, length of stay, readmissions, reoperations)
- Data analyzed using Wilcoxon rank sum and Fisher’s exact tests

## Results

- 428 patients underwent an urgent cholecystectomy
  - 28 SUB patients: 2 laparoscopic, 2 laparoscopic converted to open
  - 400 TOT patients: 397 laparoscopic, 3 open

Table 1. Patient Demographics			
Patient Demographics	SUB (n = 28)	TOT (n = 400)	p-value
Age	56.5 [48.5-64.5]	43 [33-57]	0.015
Female	11 (39.3%)	283 (70.8%)	<0.001
BMI	31.1 [24.5-33.8]	30.3 [26.1-34.7]	0.985
History of diabetes mellitus	4 (14.3%)	44 (11.0%)	0.539
History of cirrhosis/liver disease	4 (14.3%)	8 (2.0%)	0.005
History of abdominal surgery	5 (17.9%)	121 (30.3%)	0.201
Charlson-Comorbidity Index (CCI)	1 [0-3]	0 [0-2]	0.046
ASA score	2 [2-3]	2 [2-2]	0.316
History of percutaneous cholecystostomy	1 (3.6%)	4 (1.0%)	0.288
Percutaneous cholecystostomy tube present	1 (3.6%)	2 (0.5%)	0.184
History of biliary tree manipulation	2 (7.1%)	16 (4.0%)	0.332

Patients who underwent SUB were more likely to be older, male have a history of cirrhosis or liver disease, and have a higher Charlson-Comorbidity Index There was no difference in prior history of biliary tree manipulation or percutaneous cholecystostomy tubes.

Table 2. Clinical Presentation			
Postoperative Course	SUB (n=28)	TOT (n=400)	p-value
Survival to discharge	28 (100.0%)	399 (99.8%)	0.999
Length of stay (LOS) total	4 [3-7.5]	3 [2-4]	<0.001
LOS preoperative	1 [1-2]	1 [1-2]	0.580
LOS postoperative	2 [2-4.5]	1[1-2]	<0.001
Postoperative transfusion	0 (0%)	6 (1.5%)	0.999
Surgical site infection	0 (0%)	5 (1.3%)	0.999
Postoperative ERCP	3 (10.7%)	28 (7.0%)	0.444
Reoperation while hospitalized	1 (3.6%)	0 (0%)	0.065
Repeat imaging postoperatively	3 (10.7%)	18 (4.5%)	0.151
Abscess formation	2 (7.1%)	5 (1.3%)	0.071
Biloma formation	0 (0%)	4 (1.0%)	0.999
Discharged with drain	22 (78.6%)	7 (1.8%)	<0.001
Return to ED in 30 days	4 (14.3%)	18 (4.5%)	0.047
Readmission in 30 days	3 (10.7%)	13 (3.3%)	0.079
Readmission in one year	6 (21.4%)	17 (4.3%)	0.002
Reoperation in one year	2 (7.1%)	2 (0.5%)	0.023

Patients who underwent SUB presented with a higher body, a higher heart rate, a higher white blood cell count, and a higher Tokyo grade. Patients who underwent SUB were also more likely to receive preoperative antibiotics. There were no major differences in imaging performed or imaging findings between patients who underwent SUB as compared to TOT

Table 3. Intraoperative Findings			
Intraoperative Course	SUB (n=28)	TOT (n=400)	p-value
Case duration	186 [145-211]	148 [113-188]	0.003
Intraoperative blood transfusion	0 (0%)	3 (0.8%)	0.999
Estimated blood loss	50 [37.5-175]	25 [10-50]	<0.001
CVS achieved			<0.001
Yes	2 (7.1%)	328 (82.0%)	<0.001
No	22 (78.6%)	12 (3.0%)	<0.001
Not mentioned	4 (14.3%)	60 (15.0%)	0.999
Biliary tree injury	0 (0%)	1 (0.3%)	0.999
Decompression of gallbladder at start	23 (82.1%)	77 (19.3%)	<0.001
Perforated gallbladder on visualization	2 (7.1%)	3 (0.8%)	0.053
Drain placed	28 (100.0%)	46 (11.5%)	<0.001

Intraoperatively, SUB took significantly longer, had a higher estimated blood loss, and were more likely to be performed if the CVS could not be achieved. SUB patients were more likely to require decompression of the gallbladder. All SUB cases had a drain placed intraoperatively per protocol. There were no biliary tree injuries in the SUB cases but one biliary tree injury occurred in the TOT cases. There were no major vascular injuries in either group.

Table 4. Postoperative Findings			
Postoperative Course	SUB (n=28)	TOT (n=400)	p-value
Survival to discharge	28 (100.0%)	399 (99.8%)	0.999
Length of stay (LOS) total	4 [3-7.5]	3 [2-4]	<0.001
LOS preoperative	1 [1-2]	1 [1-2]	0.580
LOS postoperative	2 [2-4.5]	1[1-2]	<0.001
Postoperative transfusion	0 (0%)	6 (1.5%)	0.999
Surgical site infection	0 (0%)	5 (1.3%)	0.999
Postoperative ERCP	3 (10.7%)	28 (7.0%)	0.444
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Readmission in one year	6 (21.4%)	17 (4.3%)	0.002
Reoperation in one year	2 (7.1%)	2 (0.5%)	0.023

Postoperatively, patients who underwent SUB were more likely to have a longer LOS. None of the SUB cases required a postoperative transfusion or had a surgical site infection. Six TOT patients had a postoperative transfusion, and five TOT patients had a surgical site infection. There were no differences in abscess formation or biloma formation. Patients who underwent SUB were more likely to return to the emergency department within thirty days of the operation for a complaint related to their cholecystectomy; however, they were not more likely to be readmitted within thirty days. Patients who underwent SUB were more likely to be readmitted in one year following the operation for a concern related to their cholecystectomy. Of those patients who underwent SUB as the initial procedure, two required a reoperation in the year following their cholecystectomy which was the same for those who underwent TOT. Of the SUB patients requiring reoperation, one had a bile fluid collection due to drain migration requiring a laparoscopy and the other required a port site hernia repair.

## Limitations

- One limitation of our study is the retrospective nature of chart review
- As a single institution study this may not be generalizable to all cases of surgical management for cholecystitis
- Another limitation includes no standardized use of intraoperative terminology such as AAST grade
- We also did not have a historical control for comparison of open versus laparoscopic cases

## Conclusions & Future Directions

- SUB is more frequently performed safely in patients presenting with greater severity of illness, based on both preoperative and intraoperative factors.
- SUB spares patients the morbidity of an open cholecystectomy in the “difficult gallbladder” and can be safely performed with respect to biliary and major vascular injuries.
- Future studies assessing details of operative technique and postoperative care pathways to reduce the postoperative burden after SUB are warranted.

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